

Science for the mitigation of natural disasters

The magnitude 9 earthquake that occurred off the west coast of northern Sumatra, South Asia on December 26, 2004, spawned huge oceanic waves (tsunami). Because this was an event of low probability (but unfortunately, of high dramatic consequences), nobody had expected such a large earthquake and the powerful trans-oceanic tsunami in the Indian Ocean. This was the fourth largest earthquake in the world since 1900 and is the largest since the 1964 Prince William Sound, Alaska earthquake. More than 220,000 people were killed by the tsunami in many countries of the Indian Ocean region. More than 500,000 people were injured, and up to 5 million are lacking for basic services.

After the great 1755 Lisbon earthquake, Immanuel Kant wrote: "Providence cannot be blamed if we are erecting edifices at places with earthquake dangers" [1], an early recognition of the need to introduce preventative measures at earthquake-prone regions before the (re-) occurrence of disasters. And for the first time in history, the Lisbon earthquake forced governmental institutions to take responsibility for the consequences of a disaster.

The level of preparedness for the events of December 26th in all the countries affected turned out to be extremely low, partly because it happened without any warning. But even if warnings had been sent to the appropriate national authorities, it is unlikely that they would have been delivered in time to the public – people on the beaches and in waterfront hotels. It is also unlikely that people would have

responded to it in an appropriate manner, since most of them did not believe that such a disaster could affect them. Who was responsible for the low preparedness against such disasters? The scientists, who did not expect such large events in the region, or the Governments who had not thought enough about such natural disasters, or considered setting up a tsunami-warning network in the region? There is no simple answer. The recent tragic events have shown once again that

“...we would do well to remember that such earthquakes and tsunamis can occur again”

natural hazards are an integral component of life on Earth: what can scientists do to mitigate natural disasters? The 2002 Budapest Manifesto, which was supported by all participants of the EuroScience-IUGG-NATO Advanced Workshop on Risk, Science and Sustainable Development [2], has already put forward specific proposals on how scientists can contribute to decision-making through a risk management framework that examines natural, technical and social issues related to sustainability.

On January 7, 2005, the IUGG Commission on Geophysical Risk and Sustainability issued a Statement on the Greatest Earthquake and Tsunami of the Early 21st Century and the Need for Urgent Action to Reduce

Natural Disasters in the Indian Ocean Region and Elsewhere [3]. Among other recommendations, it states that:

- Multidisciplinary and multinational research programmes and research networks on geophysical hazards and risks should be developed... to integrate diverse data streams, to improve understanding of the natural phenomena associated with the disasters, to develop predictive modelling capability, and to generate and disseminate timely and accurate information needed by decision makers and the public.
- The countries around the Indian Ocean should set up a Disaster Management Centre in order to monitor land, ocean and atmosphere in relation to all kinds of natural hazards, especially those related to coastal regions since we now

After the 2004 Asia disaster, most governmental and non-governmental institutions, the media, and scientists are beginning to consider urgent measures to reduce natural disasters in the Indian Ocean region. However, those of us living in an earthquake-prone Europe, surrounded by the Mediterranean Sea and Atlantic Ocean, would do well to remember that the Lisbon earthquake and/or tsunami can occur again. And as European scientists, it is incumbent upon us to mobilise our efforts to mitigate natural disasters and associated risks in Europe. EUROSCIENCE is a unique organisation, capable of linking scientists from various disciplines with the media, industry, governments, and the public, and of initiating a debate about the problems of mitigation of natural disasters in Europe and elsewhere.

1 Kant, I., *Geschichte und Naturbeschreibung der merkwürdigsten Vorfaelle des Erdbebens welches am dem Ende des 1755sten Jahres einen grossen Theil der Erde erschuettert hat*. Koenigsberg, 1756.

2 Beer, T. and Ismail-Zadeh, A.T. (Eds.) *Risk Science and Sustainability*, Kluwer Academic Publishers, Dordrecht, 2003.

3 IUGG Commission on Geophysical Risk and Sustainability. 2005. *Statement on the Greatest Earthquake and Tsunami of the Early XXI Century and the Need for Urgent Action to Reduce Natural Disasters in the Indian Ocean Region and Elsewhere*. Boulder, Colorado: International Union of Geodesy and Geophysics (URL: <http://www.mitp.ru/georisk>)

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